

WHAT IS CLAIMED IS:

1           1. A method of metering the flow of a hydraulic  
2        fluid along at least one friction surface of at least  
3        one lamination of a package of neighboring laminations  
4        in an engageable and disengageable bypass clutch forming  
5        part of a hydrokinetic torque converter wherein a  
6        housing confines a pump, a stator and a turbine in  
7        addition to the bypass clutch, comprising at least one  
8        of a plurality of undertakings including:

9           a first undertaking comprising the steps of sup-  
10      plying hydraulic fluid into the housing and interfering  
11      with the flow of fluid between the turbine and an inner  
12      side of the housing to thus increase the rate of fluid  
13      flow along the at least one lamination; and

14           a second undertaking including the step of reduc-  
15      ing resistance to the flow of fluid through the bypass  
16      clutch to thus increase the rate of fluid flow along  
17      the at least one friction surface of the at least one  
18      lamination.

1           2. The method of claim 1, further comprising  
2        the steps of hydrostatically engaging and disengaging  
3        the bypass clutch, including subjecting the bypass  
4        clutch to the action of a hydrostatic fluid stream.

1           3. The method of claim 1, wherein said step of  
2        supplying hydraulic fluid includes conveying a stream  
3        of hydraulic fluid along a first path extending through  
4        the pump, turbine and stator, and thereafter along a  
5        second path between an internal surface of the housing  
6        and an external surface of the turbine.

1           4. The method of claim 1, wherein said step of  
2        supplying hydraulic fluid includes conveying a stream  
3        of hydraulic fluid along a first path extending between  
4        an internal surface of the housing and an external  
5        surface of the turbine and thereafter along a second  
6        path extending through the pump, turbine and stator.

1           5. The method of claim 1, further comprising the  
2        step of hydrostatically engaging and disengaging the  
3        bypass clutch, said resistance reducing step including

4 establishing a path for the flow of fluid between a  
5 biasing member and an adjacent lamination in the disen-  
6 gaged condition of the bypass clutch.

1           6. The method of claim 1, further comprising  
2 the step of regulating at least one of a plurality of  
3 parameters of the hydraulic fluid, said parameters  
4 including the pressure and the temperature of the fluid.

1           7. The method of claim 1, wherein said  
2 resistance reducing step includes reducing the pressure  
3 of hydraulic fluid by between about 0.1 and 3 bar.

1           8. The method of claim 7, where the pressure  
2 of hydraulic fluid is reduced between about 0.2 and 1  
3 bar.

1           9. The method of claim 1, wherein said fluid  
2 supplying step includes conveying the fluid in the  
3 housing at a rate of between about 0.1 liter and 10 li-  
4 ters per minute.

1           10. The method of claim 9, wherein said rate  
2 is between about 0.2 and 1 liter per minute.

1           11. The method of claim 1, further comprising  
2 the step of hydrostatically engaging and disengaging  
3 the bypass clutch, including conveying through the bypass  
4 clutch a discrete fluid stream at a rate and at a  
5 pressure such that the clutch is operated with slip.

1           12. The method of claim 11, wherein the discrete  
2 fluid stream is a pulsating stream.

1           13. The method of claim 11, wherein said  
2 operation with slip includes minimizing torsional vibra-  
3 tions in a power train embodying the torque converter.

1           14. The method of claim 1, wherein at least one  
2 of said undertakings includes the step of cooling the  
3 bypass clutch.

1           15. The method of claim 1, wherein at least one  
2       of said undertakings includes transmitting torque from  
3       a prime mover to an automatic transmission in the power  
4       train of a motor vehicle.

1           16. The method of claim 1, wherein at least one  
2       of said undertakings includes transmitting torque from  
3       a prime mover to a continuously variable transmission  
4       in the power train of a motor vehicle.

1           17. A hydrokinetic torque converter, comprising:  
2            a torque-transmitting housing rotatable about  
3    a predetermined axis;  
4            a rotary turbine in said housing;  
5            a bypass clutch disposed in said housing and  
6    being engageable to transmit torque from said housing  
7    to an output member of said turbine, said housing and  
8    said turbine defining a first path for the flow of a  
9    hydraulic fluid to said bypass clutch, and at least one  
10   second path; and  
11           means for opposing the flow of fluid along said  
12   second path.

1           18. The torque converter of claim 17, wherein  
2    said first path is defined at least in part by at least  
3    one first channel and said at least one second path is  
4    defined by at least one second channel.

1           19. The torque converter of claim 17, further  
2    comprising a turbine damper in said first path.

1           20. The torque converter of claim 17, wherein  
2    said flow opposing means includes a plurality of closely  
3    adjacent neighboring substantially disc-shaped elements  
4    in said second path.

1           21. The torque converter of claim 20, further  
2    comprising means for connecting said substantially disc-  
3    shaped elements to each other, including at least one  
4    rivet having a head at least partially recessed into  
5    one of said disc-shaped elements.

1           22. The torque converter of claim 20, further  
2    comprising means for connecting said substantially disc-

3       shaped elements to each other, including at least one  
4       welded seam which is at least partially recessed into  
5       one of said disc-shaped elements.

1               23. The torque converter of claim 20, wherein at least  
2       one of said substantially disc-shaped elements is a  
3       stamping having at least one projection extending away  
4       from a neighboring substantially disc-shaped element  
5       of said plurality of elements.

1               24. The torque converter of claim 23, wherein  
2       said at least one projection is one of a burr and a bent  
3       portion of said at least one substantially disc-shaped  
4       element.

1               25. The torque converter of claim 20, wherein  
2       at least one of said substantially disc-shaped elements  
3       is a cutting having at least one projection extending  
4       away from a neighboring substantially disc-shaped  
5       element of said plurality of elements.

1           26. The torque converter of claim 20, wherein  
2       at least one of said substantially disc-shaped elements  
3       has a surface confronting another of said substantially  
4       disc-shaped elements and having a secondary finish.

1           27. The torque converter of claim 26, wherein  
2       said secondary finish includes treatment in at least  
3       one of machines including grinding and turning machines.

1           28. The torque converter of claim 20, wherein  
2       said substantially disc-shaped elements include first  
3       and second elements spaced apart from each other by  
4       clearances having a width of between about 0.1 and 2  
5       mm as seen in the direction of said axis, said clearances  
6       having a length of between about 1 and 30 mm as seen  
7       radially of said axis.

1           29. The torque converter of claim 28, wherein said  
2       width is between about 0.5 and 1 mm and said length is  
3       between about 1 and 10 mm.

1           30. The torque converter of claim 20, wherein  
2        said bypass clutch comprises a plurality of laminations,  
3        at least one of said substantially disc-shaped elements  
4        forming part of one of said laminations.

1           31. The torque converter of claim 20, further  
2        comprising a turbine damper provided in said housing  
3        and having at least one input element, one of said sub-  
4        stantially disc-shaped elements forming part of said  
5        at least one input element.

1           32. The torque converter of claim 20, further  
2        comprising a turbine damper in said housing, said damper  
3        including a flange and one of said substantially disc-  
4        shaped elements forming part of said flange.

1           33. The torque converter of claim 20, wherein  
2        said turbine includes a hub and one of said substan-  
3        tially disc-shaped elements forms part of said hub.

1           34. The torque converter of claim 17, wherein  
2    said flow opposing means comprises at least one sealing  
3    ring.

1           35. The torque converter of claim 17, wherein  
2    said flow opposing means comprises a diaphragm spring.

1           36. The torque converter of claim 17, wherein  
2    said flow opposing means comprises at least one  
3    diaphragm.

1           37. The torque converter of claim 36, wherein  
2    said bypass clutch comprises a package of neighboring  
3    laminations, a first carrier for a first set of said  
4    package of laminations, and a second carrier arranged  
5    to support a second set of said package of laminations,  
6    said second carrier being disposed between said first  
7    carrier and said axis and said at least one diaphragm  
8    being borne by said second carrier and engaging a safety  
9    ring on said first carrier.

1           38. The torque converter of claim 36, wherein  
2        said bypass clutch comprises a package of neighboring  
3        laminations, a first carrier for a first set of said  
4        package of laminations, and a second carrier arranged  
5        to support a second set of laminations which alternate  
6        with the laminations of said first set, said second  
7        carrier being disposed between said first carrier and  
8        said axis and said diaphragm being borne by said second  
9        carrier and abutting one of a pressure plate and one  
10      of said laminations.

1           39. The torque converter of claim 36, further  
2        comprising a damper for said turbine, said damper  
3        comprising an input element and said bypass clutch  
4        comprising a package of laminations and at least one  
5        carrier for said laminations, said diaphragm being  
6        riveted to one of said input element and said at least  
7        one carrier.

1           40. The torque converter of claim 17, wherein  
2        said bypass clutch comprises a package of laminations  
3        and a carrier for said laminations, said means for  
4        opposing including an annular member contacting said  
5        carrier and one of said laminations.

1           41. The torque converter of claim 40, wherein  
2        said annular member is arranged to be recessed into said  
3        carrier.

1           42. The torque converter of claim 17, further  
2        comprising a damper for said turbine, said damper having  
3        an input element and a flange and said opposing means  
4        comprising one of a sealing ring and a diaphragm spring  
5        and being arranged to operate between said input element  
6        and said flange.

1           43. The torque converter of claim 17, further  
2        comprising a turbine damper having a flange, said turbine  
3        having a hub and said means for opposing including one  
4        of a sealing ring and a diaphragm spring disposed  
5        between said flange and said hub.

1           44. The torque converter of claim 17, further  
2        comprising a turbine damper having a flange, said  
3        turbine having a hub-shaped support and said opposing  
4        means comprising one of a sealing ring and a diaphragm  
5        spring disposed between said flange and said support.

1           45. The torque converter of claim 17, wherein  
2        said bypass clutch comprises a package of laminations,  
3        a first carrier for said laminations and a second  
4        carrier for said laminations, said second carrier being  
5        disposed between said first carrier and said axis and  
6        one of said laminations having at least one axial inlet  
7        opening for hydraulic fluid.

1           46. The torque converter of claim 17, wherein  
2        said bypass clutch comprises a package of annular  
3        laminations, a first carrier for said laminations and  
4        a second carrier for said laminations, said second  
5        carrier being disposed between said first carrier and  
6        said axis and at least one of said laminations having  
7        a toothed marginal portion adjacent one of said carriers  
8        and defining with said one carrier a plurality of  
9        passages for the flow of hydraulic fluid therethrough.

1           47. A power train for use in a motor vehicle,  
2 comprising:

3           a prime mover;  
4           a transmission; and

5           a hydrokinetic torque converter between said  
6 prime mover and said transmission and comprising a torque-  
7 transmitting housing rotatable about a predetermined  
8 axis, a rotary turbine in said housing, a bypass clutch  
9 disposed in said housing and being engageable to  
10 transmit torque from said housing to an output member  
11 of said turbine, said housing and said turbine defining  
12 a first path for the flow of a hydraulic fluid to said  
13 bypass clutch and at least one second path, and means  
14 for opposing the flow of fluid along said second path.